



# ADVISORY CIRCULAR

**CAA-AC- AGA403**

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## PROCEDURES FOR PROTECTION OF SITES FOR RADAR AND NAVIGATIONAL AIDS

### 1. PURPOSE

The aim of these guidance materials is to provide procedures to ensure there will be no interference with the operation of air navigation aids located at the aerodrome and outside the aerodromes that may be caused by the erection of structures, or aerodrome work activities within the vicinity of a navigation aid or associated cabling system.

### 2. REFERENCE

- 2.1 Civil Aviation (Aerodromes) Regulations as amended

### 3. INTRODUCTION

Civil Aviation (Aerodromes) Regulations, as amended, specify the requirements for the protection of radar and navigational facilities located at aerodromes. The regulation states that:

An operator shall in consultation with the Authority –

- (a) prevent construction of any facilities on the aerodrome, which may adversely affect the operation of any electronic or visual navigation or air traffic service facility on the aerodrome;
- (b) as far as it is within the authority of the operator, prevent any interruption of visual or electronic signal of navigation aids.

### 4. RESPONSIBILITIES

The aerodrome operator has overall responsibility for establishing procedures to ensure that activities or works under his direct or indirect control do not have an adverse impact on the safe operation of radar and navigational aids.

Particulars of the procedures for the protection of sites for radar and radio navigational aids located on or outside the aerodrome to ensure that their performance will not be degraded shall include arrangements for:

- a) control of activities in the vicinity of radar and navaids installations;
- b) ground maintenance in the vicinity of these installations; and
- c) the supply and installation of signs warning hazardous microwave radiation.

In writing the procedures for each category, clear and precise information should be included on:

- when, or in what circumstances, an operating procedure is to be activated
- how an operating procedure is to be activated and any actions to be taken;
- the persons who are to carry out the actions; and
- the equipment necessary for carrying out the actions, and access to such equipment.

In case of aerodrome works that may affect navigation aids, the Works Manager at the aerodrome, or any other staff member controlling any construction works at the aerodrome, is responsible for advising air navigation service provider (ANSP) of any works proposals that may affect the operation of radar or navigational aids at the aerodrome, including any cables associated with the facilities.

The ANSP is responsible for the physical protection of its radar and navigational aids. This should include appropriate fencing and warning signs to restrict entry to each site.

## **5. WORKS PLANNING AND COORDINATION**

The aerodrome operator is required to give prior notification of airport works to ANSP on:

- Work activities in the vicinity of radar and navigational aids which might affect the signals to and from those facilities; and
- Proposed excavation work within 3m of cables associated with the facilities.

This notification shall be provided formally during the planning stage of a Method of Works Plan (MOWP) or Permit to Commence Work (PERCOW). The aerodrome operator shall prepare a (PERCOW) or a MOWP) for any activity that may affect aircraft operations by causing interference with a radar or navigation aid, or its signal to aircraft. Planning for such work shall include input from ANSP. ANSP shall establish any restrictions necessary. A copy of any MOWP or PERCOW issued for such works shall be forwarded to ANSP and the CAA.

The Works Manager and Works Supervisor shall ensure that all persons involved in works at the aerodrome understand and comply with the restrictions imposed to protect

the radar, navigational aids, and their associated cabling system. This applies to workmen, sub-contractors, and any other organization carrying out works at the aerodrome. Where there is a possibility of interference with the radar or navigation aid signal due to transient obstacles, such as vehicles traveling on perimeter roads, signs displaying the appropriate warning or instruction shall be erected.

Vehicles and plant shall not enter the navigation aid restricted areas of the airside or any other adjacent locations without prior ANSP approval. Vehicles crossing near the navigation aids shall maintain a speed of not more than 30 km per hour to avoid signal interference.

## **6. MAINTENANCE WORKS AFFECTING RADAR AND NAVIGATION AIDS**

All ANSP personnel or contractors are required to abide by the security arrangements for gaining access into the airside.

The Aerodrome operator shall contact ANSP where mowing works may affect navigation aid signals. The Maintenance Supervisor, shall contact ANSP at least 24 hours prior to the commencement of the works to ensure that navigational aids can be turned off when required (e.g. nav aids may not be turned off under Instrument Meteorological Conditions (IMC) or when flight tests are in progress).

As a guide in preparing for minor maintenance activity, work within the following areas can be expected to cause interference with the relevant navigation aid:

- a) Localizer - from 360 metres in front to 10 metres behind the localizer aerial, and 90m either side of the runway centreline;
- b) Glide path - from glide path building, an area extending 700 m directly in front of the building towards the landing aircraft, at a width of 175 m towards the associated runway centreline; and
- c) VOR - within a radius of 150 m of the VOR.

The ANSP shall also be contacted for any other major works or works involving a large amount of equipment, or tall equipment that may affect the radar or navigational aids.

## **7. CLEARANCE AND LOCATIONS FOR RADAR AND NAVIGATION AIDS**

Clearances and locations of radar and navigational aids facilities associated with the aerodrome shall be shown in the aerodrome plan to ensure that the relevant radar and navigation aids are easily identifiable to enable their protection.

## **7.1 Radar Antenna Sites**

**7.1.1 Site requirements.** The site requirement for existing types of radar antennae is a rectangular area about 50m by 40m.

### **7.1.2 Clearance requirements.**

Radar transmission clearance requirements are intended to prevent the following:

(a) holes in the coverage by new constructions blocking line of sight between radar and aircraft. Any construction, which geometrically intrudes above the existing skyline as seen by the radar, will have an effect.

(b) Interference with near fields of the antenna, which may disturb the antenna pattern in the far field. This applies within 500m of most radars.

(c) Diffraction and bending of signals by edges and thin objects which can cause incorrect radar determined location, loss or confusion of radar tracks etc. Likely hazards in this regard are poles such as lighting poles.

(d) Reflections of the radar signals from fixed or mobile surfaces. Reflections cause aircraft to appear on radar screens in more than one location.

The following clearance requirements are to be maintained:

(a) No intrusion within 1km of the radar into a height surface 5m below the bottom of the antenna. No intrusion between the radar and the possible location of any desired targets, i.e. roughly speaking above 0.5 degrees elevation at any distance.

(b) No metallic or other electrical reflective surfaces anywhere which subtend an angle of more than 0.5 degrees when viewed from the radar, e.g. Fences, power lines, tanks as well as many buildings. All overhead power lines within 1 km must be aligned radically to the radar or be located at least 10 degrees below horizontal from the antenna.

(c) No radio interference emitters within 2km having any component of transmission in the radar bands, e .g. Welders and electrical transmission lines. No electrical transmission lines within the following specified distances:

- I. 2kV - 22kV 400 m
- II. 22kV - 110kV 1 km
- III. above 110kV 2 km

(d) Other electronic equipment may be affected by the radar transmissions. Such equipment should not be located where the radars may interfere with their performance.

People are therefore to be cautioned against approaching any location within a 500m radius of a primary radar antenna and which is between 5m below and 50m above the horizontal level of the bottom of the antenna.

## 7.2 Other Navigational Facilities

**7.2.1 Site requirements.** The physical site requirements will vary significantly depending on the type of communications facility, and it is therefore not possible to specify a general requirement and hence it shall be on specific basis (other than for Satellite ground station sites).

**7.2.3 Clearance requirements.** Reliable VHF/UHF communications require a clear line-of-sight path between the base station and aircraft and vehicles using the facilities. The construction of buildings, towers, etc., may prevent reliable communications hence shall not be allowed within a safe distance specified by the equipment manufacturer.

**7.2.4 Satellite Ground Stations.** The site requirement is a square area of dimension 25m by 25m.



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